Case Assignment

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Abstract

In this paper, I examined how to use descriptive statistics and graphical representations to analyze demographic variables, which includes age, gender, and marital status, in a sample of 439 participants. In this paper, I explored how continuous and categorical data can be summarized and visualized to show patterns, distributions, and proportions in a population. In this paper, I used histograms to show the distribution of ages, highlighting participants in early to middle adulthood, while bar plots showed the proportions of gender and marital status categories. In this paper, the analysis showed population characteristics and potential implications for social and behavioral research. In this paper, I focused on strengths and limitations of graphical representations, which emphasized roles in clarifying patterns but seeing any constraints in revealing causal relationships. Overall, this study showed how combining numerical summaries with visual tools helps the understanding of demographic data, supporting accurate interpretation and future research design.

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Descriptive Analysis of Age, Gender, and Marital Status in the Sample Population

Introduction

Descriptive statistics are an important foundation of quantitative research because they provide researchers with the tools to summarize, visualize, and interpret data collected from a sample population (Nick, 2007.). For example, in a study examining community health behaviors, descriptive statistics can show the average age of participants, the proportion of males to females, or the distribution of marital status, which can help researchers identify key demographic patterns before performing advanced analyses (Lane, n.d.). Using these techniques can help researchers to accurately describe their sample and detect trends that can influence study outcomes, such as whether certain age groups are more likely to participate in specific behaviors (Complete Dissertation, n.d.). Understanding the basic characteristics of a population helps researchers make sense of the results and plan how to design the study, analyze the data, and interpret findings. For example, seeing the age range of participants can show whether most are young adults, middle-aged, or older adults, which can affect what questions are asked or how the results are interpreted. Looking at gender and marital status can also help researchers make sure all key subgroups are included, to ensure the findings are fair (Wyzant, n.d.). Overall, by paying attention to the characteristics,

researchers can plan their methods and choose the right analyses, which allows researchers to present findings that show the participants' traits and experiences (Lane, n.d.).

Study Overview and Sample Description

In this study, the three variables are age, gender, and marital status from a sample of 439 participants. These variables were selected to help identify patterns in the data and to show how descriptive statistics and visualizations, such as bar plots and histograms, which can help to understand characteristics of participants. For example, examining the age variable can help researchers to see the average of participants and how ages are spread across the sample, while gender and marital status can show the proportion of males and females or distribution of single, married, and divorced participants. Using these variables and visual tools can help provide a clear picture of the population, which can make findings easier to interpret (Biostatistics Resource Channel, 2012).

Age is a continuous variable measured in years, which makes it suitable for examining averages, variability, and overall distribution with the sample (Biostatistics Resource Channel, 2012). For example, researchers can assess measures such as mean, median, and standard deviation, which can help describe how ages are spread across participants to understand the typical age in the study. Gender is nominal variable with two categories, male and female, and is used to compare proportions within the sample (Wyzant, n.d.). For example, researchers can see whether there are more females than

males and consider how this can impact interpretation. Marital status is also a nominal variable and includes numerous categories, such as single, married for the first time, remarried, divorced, separated, widowed, living with a partner, and being in a steady relationship (LibreTexts Statistics, 2013). For example, analyzing the number of participants in each marital category can help identify patterns such as the most common marital status in the sample. Overall, defining these demographic variables can help researchers interpret results accurately and understand how different participant characteristics are related to broader social and behavioral patterns (Wyzant, n.d.).

This paper uses bar plots and histograms to visually display the distribution of demographic variables, along with descriptive statistics such as mean, median, standard deviation, counts, and percentages. For example, bar plots are useful fro showing differences in gender and marital status categories, while histograms provide a visual presentation of how age values are distributed across the sample. Combining numerical summaries with visual displays can help make the results easier to interpret and show the importance of selecting visualization methods that can match the type of variable being analyzed. Together, these methods show an overview of the sample's demographic distribution and accurate interpretation of the findings for future research and applied decision-making (LibreTexts Statistics, 2013).

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Variables and Measurement Scales

The three variables selected for analysis age, gender, and marital status which represent different types of data, each requiring a specific approach for accurate interpretation and visualization. Understanding the differences are important because it helps researchers to choose the correct statistical methods and visual tools that can highlight patterns within the data (Wyzant, n.d.). For example, continuous variables such as age can be analyzed using measures of average trends and variability, while categorical variables such as gender or marital status are represented through frequency counts or bar charts. These calculations provide insights into values and the spread of participants' ages, showing how closely or widely individual ages cluster around the average. For example, knowing the mean, median, and range can help researchers see wether most participants are young adults, middle-aged, or older, and wether a few ages that fall far outside the typical range could affect the analysis (Complete Dissertation, n.d.). Understanding this variability is important because age can influence behaviors, preferences, and outcomes in research, seeing how ages distributed helps interpret the findings accurately.

The standard deviation of 13.2 shows moderate variability in the participants' ages, showing that most ages are close to the average, but some participants are somewhat younger or older than the mean. For example, although the average participant is in their mid-30s, a few individuals are as young as 18 or as old as 82, which shows that the

sample includes a range of ages that can provide broader insights into the population (Biostatistics Resource Channel, 2012). Understanding age-related information is important because participants' ages can affect their behaviors, responses, or outcomes within a study. For example, younger adults could respond differently to survey questions about health behaviors compared to older adults, or may participate in certain activities at different rates, which can influence study findings (Lane, n.d.). By knowing the age distribution, researchers can interpret results more accurately, ensure analyses account for potential age differences, and design interventions that are appropriate for specific age groups.

Gender is a nominal variable, meaning it is measured in categories rather than as a numerical value, with participants classified as either male or female. For example, in this study, the sample included 185 males (42.1%) and 254 females (57.9%), showing a higher proportion of females. This information is important for researchers because understanding the gender distribution can help identify patterns. This can ensure that the study results are not biased toward one group, and inform interpretations of behaviors or outcomes that can differ between males and females (Biostatistics Resource Channel, 2012).

Marital status is another nominal variable, in other words, it is measured using categories rather than numbers, and in this study, participants were classified into eight distinct subgroups. These subgroups include single, married for the first time, steady relationship, living with a partner, remarried, divorced, separated, and widowed. For example, the largest group was married for the first time (43.1%), followed by single

participants (23.9%), while the smallest group was widowed (1.6%). Understanding the distribution of marital status is valuable for researchers because marital status can influence social, economic, and health outcomes. Overall, by examining these categories, researchers can identify patterns across different groups, which can inform study interpretations and potential interventions (Wyzant, n.d.).

Descriptive Statistics and Graphical Representations

Descriptive statistics are used to summarize large datasets and present findings in a clear interpretable method, which helps researchers to understand patterns within the data before conducting advanced analyses (Wyzant, n.d.). For example, descriptive statistics help organize raw data into understandable summaries that show patterns, variability, and group differences within the sample (Lane, n.d.). For Age, the histogram is used to visually display how participants are distributed across different age ranges. For example, the histogram can show whether most participants fall within young and adulthood or middle adulthood and wether smaller numbers of participants appear at the younger or older ends of the age range, making patterns and variations easier to observe (Complete Dissertation, n.d.).

For age, most participants cluster between 30 and 40 years, creating a high point that shows a concentration in young-to-middle adulthood. For example, this shows that most of the sample is in the early to mid-career range, which can influence behaviors or responses observed in the study. The histogram also shows both ends of the age spectrum,

showing that while younger adults (18–29 years) and older adults (60 years and older) are represented in smaller numbers, they are still included in the sample. For example, researchers can see that even though smaller numbers of participants at these age extremes, their inclusion helps the sample represent a full age spectrum, which is important for generalized findings. When combined with numerical summaries such as the mean, median, and standard deviation, this visual helps researchers to understand the spread, clustering, and distribution of ages within the sample (Complete Dissertation, n.d.).

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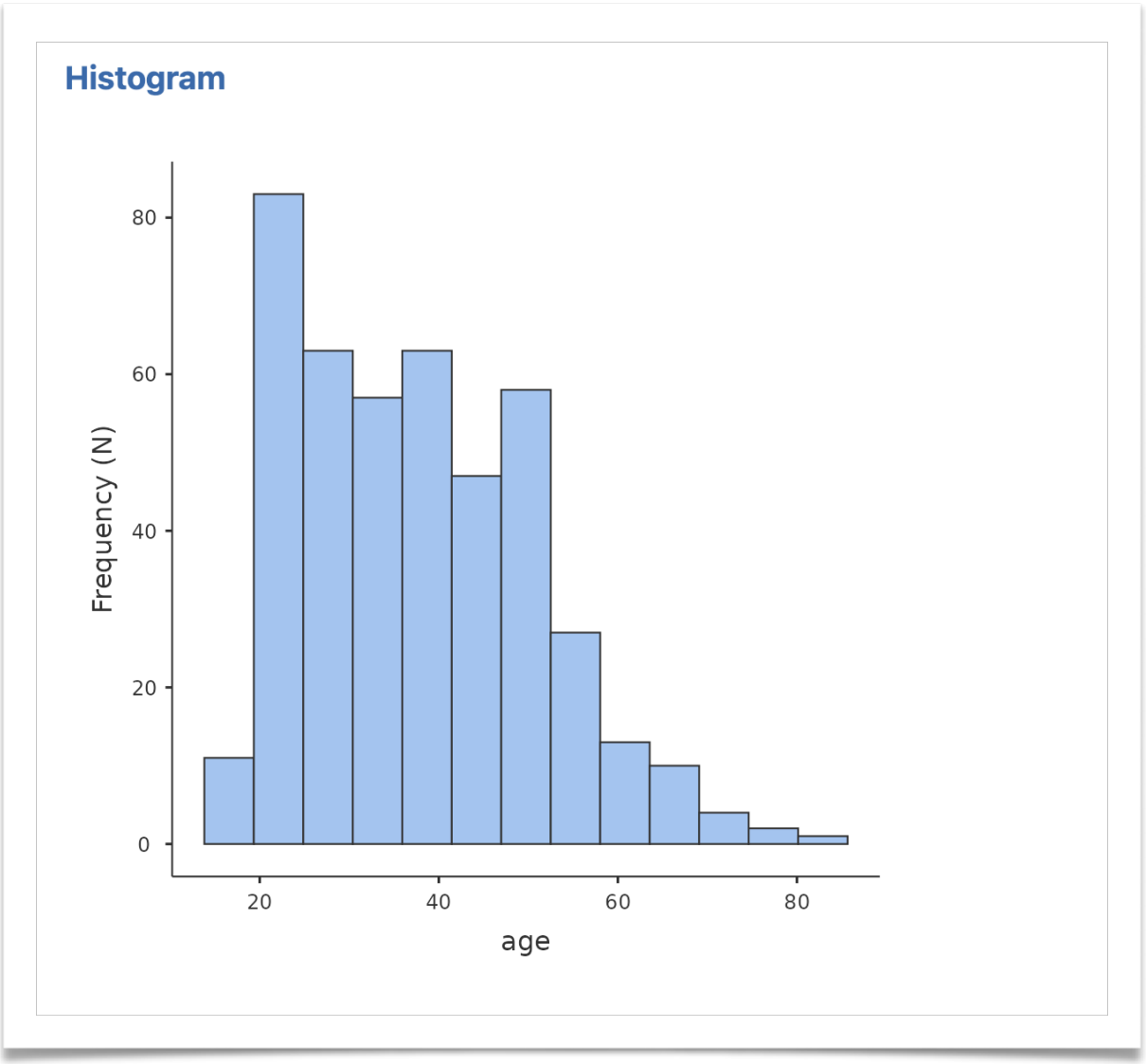
Figure 1. Age Distribution of Participants



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For gender, the bar plot is used to show the proportion of male and female participants in the sample. For example, the bars show that there are 185 (42.1%) and females 254 (57.9%), which shows that females outnumber males, this can help researchers identify group differences and consider gender-related influences in the study (LibreTexts Statistics, 2013). Bar plots are useful for nominal variables because they help researchers to compare group sizes and indemnify differences without relying on numerical tables only (Biostatistics Resource Channel, 2012). For example, by viewing the bar plot for gender, researchers can see that females slightly outnumber males, which can influence interpretations of survey responses or guide recruitment strategies in future studies (LibreTexts Statistics, 2013).

Figure 2. Gender Distribution of Participants

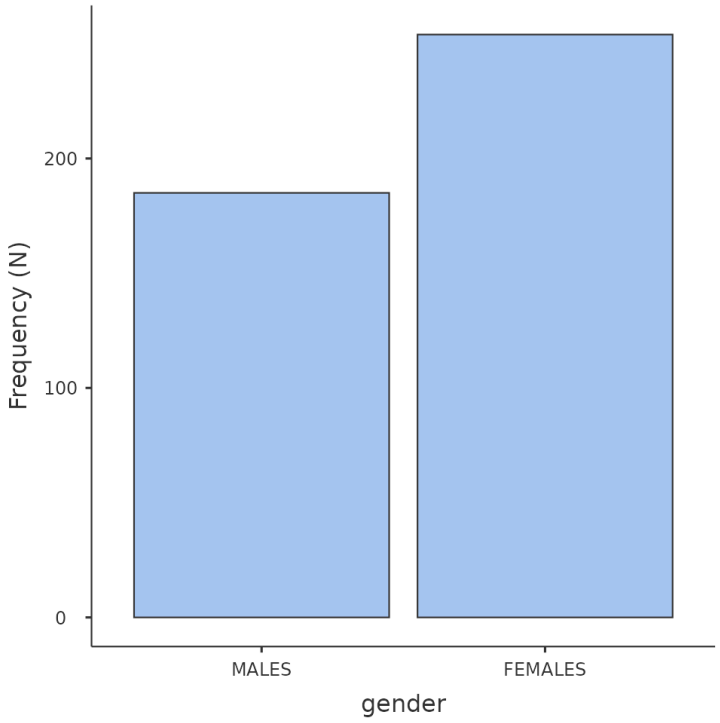
Results

Descriptives

Descriptives

	age	gender	marital
N	439	439	439
Missing	0	0	0
Mean	37.4	1.58	3.37
Median	36.0	2	4
Standard deviation	13.2	0.494	1.76
Minimum	18.0	1	1
Maximum	82.0	2	8

Bar Plot



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For marital status, the bar plot used shows the eight categories. For example, the chart shows that (43.1%) of participants are married for the first time, single participants (23.9%), in a steady relationship (8.4 %), remarried participants (6.8%), divorced participants (5.5.%), separated participants (2.3%), and widowed participants (1.6%), make up the sample, which makes it easy to see which groups are most common. This visual shows how researchers can identify patterns in marital status, which is helpful for social science studies because marital status can influence behaviors, economic, or health outcomes (Wyzant, n.d.). Each bar shows the relative size of each category, which makes it easier to interpret than reading a table of percentages. For example, a researcher can see that married first-time participants (43.1%) represent the largest group, while widowed participants (1.6%) are the smallest group, which can help key patterns in the sample. By showing the data this way, researchers can easily identify the most common categories and consider any potential implications for social and behavioral studies (Cooksey, 2020).

Figure 3. Marital Status Distribution of Participants

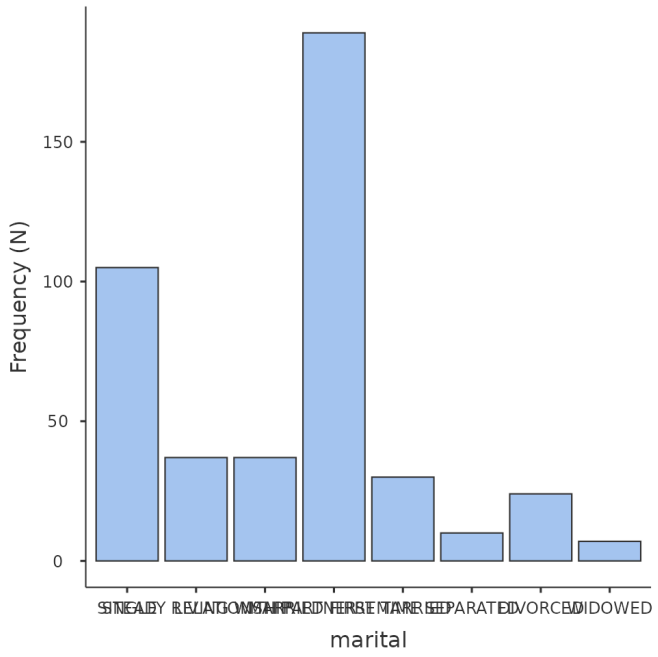
Results

Descriptives

Descriptives

	age	gender	marital
N	439	439	439
Missing	0	0	0
Mean	37.4	1.58	3.37
Median	36.0	2	4
Standard deviation	13.2	0.494	1.76
Minimum	18.0	1	1
Maximum	82.0	2	8

Bar Plot



Interpretation and Insights

The combination of descriptive statistics and graphical representations shows how researchers can gain a clear and well-rounded understanding of sample population. For example, numerical summaries provide exact values, while graphs make overall patterns easier to see, which helps researchers interpret results effectively (Tuovila, 2022). The age histogram shows that most participants fall within early to middle adulthood. For example, the clustering of ages around the mid-30s to early 40s shows that the sample is mostly made up of working age adults, rather than adolescents or older adults (Complete Dissertation, n.d.). This is important for studies that examine age related outcomes, such as work performance, health behaviors, or social engagement. For example, programs designed to improve workplace well-being or health habits can be more effective when focused on adults in this age range, since this represents the majority of the sample (Tuovila, 2022).

The gender bar plot shows a slightly higher number of females, which can influence study findings in research areas such as health surveys, psychological studies, or social behavior investigations. For example, gender differences can play a role in shaping the results (Wyzant, n.d.). Marital Status patterns show that most participants are married for the first time, followed by singles, which can reflect cultural or socioeconomic patterns in the sample. For example, this distribution suggests a ovulation that is largely established

in long term relationships during mid-adulthood (LibreTexts Statistics, 2013). Smaller groups, such as widowed or separated participants, provide an important framework for interpreting the data. For example, even though the groups represent a smaller portion of the sample, they have a unique social and emotional need that are important in targeted research or intervention efforts (Lane n.d.). Looking at all these findings together, researchers gain an understanding of the sample's demographic makeup, which is important for designing studies, interpreting results, and understanding population patterns. For example, knowing the age, gender, and marital status patterns can help researchers determine how findings can apply to similar populations (Tuovila, 2022).

Strengths and Limitations of Graphical Representations

Each graph was selected to match the variable being analyzed, with bar plots used for categorical variables such as gender and marital status, and a histogram used for the continuous variable, age. For example, gender and marital status are grouped into categories, which makes bar plots appropriate,, while age is measured numerically and is best displayed using a histogram (Lane.n.d). These choices help make the data easier to understand and interpret correctly. For example, using correct type of graph reduces confusion and helps readers to recognize patterns in the data (LibreTexts Statistics, 2013). Bar plot make it easy to compare the size of different groups, while histograms help show how values are spread across a continuous variable. For example, a bar plot can show

whether there are more females than males in the sample, while histogram can show whether most participant ages fall within a specific range (LibreTexts Statistics, 2013). However, there are limitations when using these graphical methods (Lane, n.d.). While histograms are useful for showing overall age patterns, they do not show how age relates to other variables on their own. For example, a histogram can display how ages are distributed in the sample, but it cannot show wether age differs by gender or marital status without additional analyses (LibreTexts Statistics, 2013). Bar plots are easy to read, but can sometimes oversimplify differences within categories. For example, a bar plot might show the number of participants in each marital status group but does not capture differences in the groups, such as age variation of married participants (Biostatistics Resource Channel, 2012). Although descriptive statistics are useful for summarizing data, they cannot be used to determine cause and effect relationships or make predictions. For example, descriptive statistics can show the average age of participants, but does not explain why certain age groups might respond differently (Lane, n.d.). Even though the sample size is large, it might not represent the wider population, which can limit how the results can apply. For example, if certain age groups or marital categories are underrepresented, the findings might not reflect those populations accurately (Wyzant, n.d.). Overall, recognizing these limitations is important for interpreting the results and reporting them responsibly (Lane, n.d.).

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Conclusion

This study applied descriptive statistics and graphical representations to examine age, gender, and marital status within a sample of 439 participants. Overall, using visual tools, including histograms for continuous variables and bar plots for categorical variables, helps provide a clear and organized summary of the sample's demographic structure. These methods support an accurate presentation of the data and clarified interpretability. The results show the importance of selecting visualization techniques that match each variable type by reinforcing the role of descriptive analysis in quantitative research. Bar plots allowed direct comparison of gender and marital status groups, while the age histogram showed the distribution and variability of participant ages. Together, these methods provided a structured overview of the sample and highlighted key demographic patterns relevant to social and behavioral research. Even though descriptive statistics and visualizations are effective for summarizing data, they have limitations and do not allow for causal conclusions or predictive analysis. Recognizing the boundaries is important for responsible interpretation and reporting. Overall, this project reinforces the role of descriptive statistics as a foundational component of quantitative research and demonstrates how visual and numerical summaries can help future study design, analysis, and interpretation.

References

Biostatistics Resource Channel. (2012, September 10). How to use SPSS - Frequency distributions & measures of central tendency [Video]. YouTube. https://www.youtube.com/watch?v=3ejAt1yPhLQ

Complete Dissertation. (n.d.). *Descriptive statistics and interpreting statistics*. https://www.statisticssolutions.com/dissertation-resources/descriptive-statistics/

Cooksey RW. Descriptive Statistics for Summarising Data. Illustrating Statistical Procedures: Finding Meaning in Quantitative Data. 2020 May 15:61–139. doi: 10.1007/978-981-15-2537-7_5. PMCID: PMC7221239.

Lane, D. (n.d.). *Sampling bias*. http://onlinestatbook.com/2/research_design/sampling.html

LibreTexts Statistics. (2013). *Observational studies and sampling strategies*. https://stats.libretexts.org/Textbook_Maps/General_Statistics/OpenIntro_Statistics/Introduction_to_data/Observational_studies_and_sampling_strategies

Nick TG. Descriptive statistics. Methods Mol Biol. 2007;404:33-52. doi: 10.1007/978-1-59745-530-5_3. PMID: 18450044.

Tuovila, A. (2022, December 24). *Standard error of the mean vs. standard deviation: What's the difference?* Investopedia. https://www.investopedia.com/ask/answers/042415/what-difference-between-standard-error-means-and-standard-deviation.asp

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Wyzant. (n.d.). *Sampling*. https://www.wyzant.com/resources/lessons/math/statistics_and_probability/introduction/sampling